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MOLE CRICKETS IN FLORIDA AND NEIGHBORING STATES (ORTHOPTERA: GRYLLOTALPIDAE)[1]

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INTRODUCTION: Mole crickets are large, near-cylindrical crickets with mole-like digging forelimbs (fig. 1, 2). The adults have wings, and many are powerful, though clumsy, fliers. Mole crickets are most often seen when they end their flights at lights (or in swimming pools, where they swim rapidly on the surface, buoyed up by their short, dense, unwettable pile). Otherwise mole crickets remain in tunnel systems in the soil, their presence revealed chiefly by long tracks of pushed up soil associated with their tunneling just beneath the surface. Three of the 4 species of mole crickets occurring in southeastern United States were accidentally introduced from South America and belong to the genus Scapteriscus. The fourth is the northern mole cricket, Neocurtilla hexadactyla (Perty), a native species.

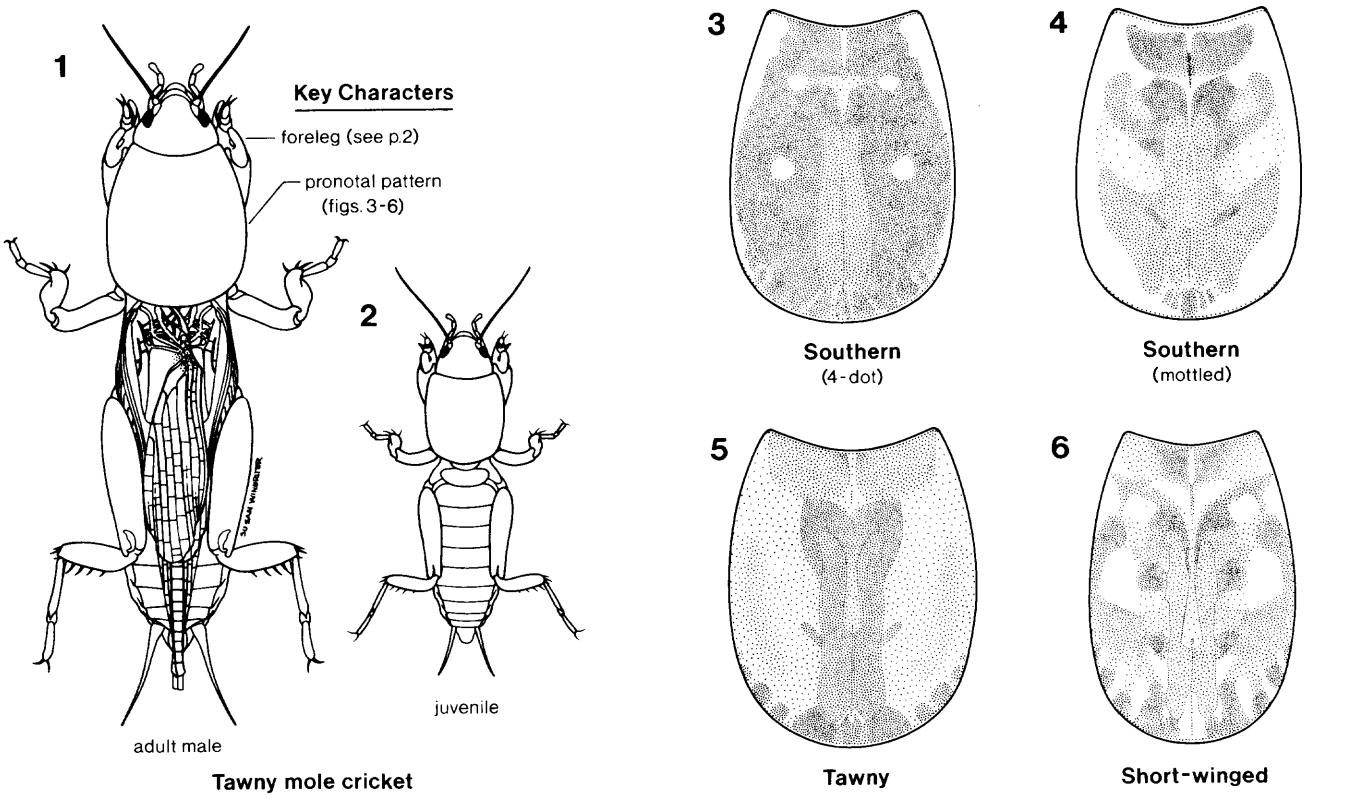

Fig. 1-2. Scapteriscus vicinus, adult male and juvenile. Fig. 3-6. Pronotal patterns of adult Scapteriscus. Fig. 3. S. acletus, 4-dot form. Fig. 4. S. acletus, mottled form. Fig. 5. S. vicinus. Fig. 6. S. abbreviatus.

IDENTIFICATION: The northern mole cricket has 6 dactyls (digging nails) on each foreleg (fig. 8), whereas species of Scapteriscus have 4 (fig. 7, 9-11). In every case 2 of the dactyls are extensions of tarsal segments (i.e., tarsal dactyls) and the remainder are projections of the tibia (i.e., tibial dactyls), the leg segment that also bears the tympanum (eardrum).

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The southern mole cricket (fig. 17), once believed to be native to southeastern United States, was first introduced at the same place and about the same time as the tawny mole cricket. However, subsequent introductions occurred at Charleston, South Carolina (1915), Mobile, Alabama (1919), and Port Arthur, Texas (1925). The introductions at Charleston and Port Arthur were of the 4-dot form (fig. 3), whereas the introductions at Brunswick and Mobile were of the mottled form (fig. 4), as reflected by the present distributions of the 2 forms (fig. 16). The occurrence of 4-dot rather than mottled acletus in peninsular Florida can be attributed either to another introduction (probably at Jacksonville in the 1920's) or to the spread of 4-dot acletus from South Carolina down the coastal islands of Georgia.

The short-winged mole cricket is flightless and has not spread far from its initial ports of introduction (fig. 19). Its absence from inland locations is noteworthy; its ultimate range is highly uncertain.

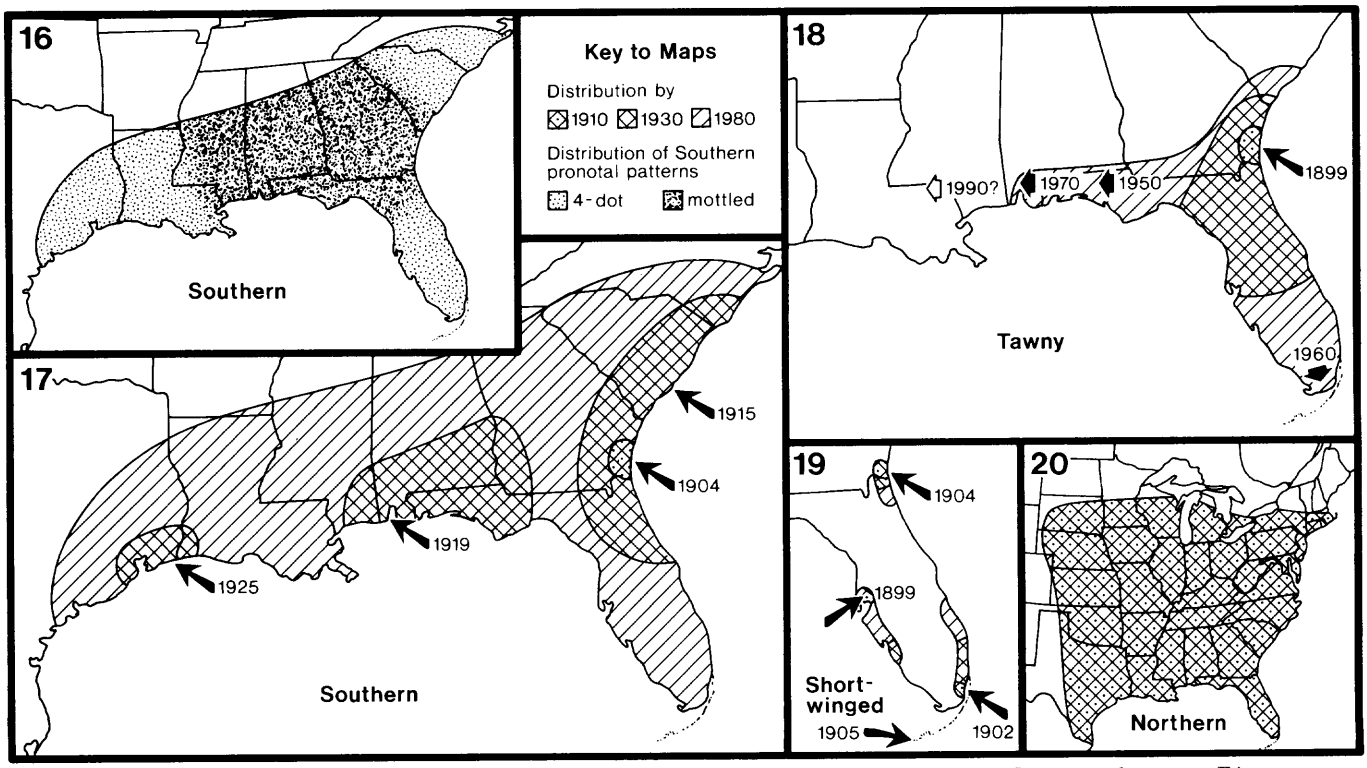

Fig. 16-20. Distribution and history of southeastern mole crickets. Fig. 16, 17. Scapteriscus acletus. Fig. 18. S. vicinus. Fig. 19. S. abbreviatus. Fig. 20. Neocurtilla hexadactyla (the only species that is native).

LIFE CYCLE: The seasonal life cycles of mole crickets are imperfectly known (2), and those of introduced species may have yet to complete their adjustment to the climates of recently invaded areas.

Northern mole crickets apparently take 2 years to develop in most of their range but in northern Florida have a 1-year life cycle similar to those of the tawny and southern mole crickets. The latter 2 species lay eggs (in underground cells) in the spring, juveniles develop mostly during the summer months, and large juveniles and new adults overwinter. Overwintering juveniles mature in time to participate in late spring egg laying. Flights of tawny and southern mole crickets help them find mates and new areas to colonize (1,6). The largest flights are generally in the spring with fall flights being smaller and more variable. In southern Florida, but not elsewhere in the state, large flights of southern mole crickets occur in midsummer, suggesting a 2-generation life cycle. The short-winged mole cricket occurs in all stages at all times of year.

ECONOMIC IMPORTANCE: Mole crickets damage lawns, golf courses, and pastures, sometimes necessitating replanting. They also destroy seedlings of vegetables and tobacco. Damage is due both to feeding and tunneling, but little is known of the relative importance of these 2 modes under particular circumstances. The annual dollar cost of mole crickets in the Southeast is surely in the tens of millions -- as suggested by the approximately 146

tons of active ingredients (costing ca. $11.7 million) applied for insecticidal control of mole crickets in Florida in 1980.

The 4 species are not of equal importance. The tawny mole cricket feeds principally on plant material and can destroy well-established grass. The short-winged mole cricket has a similar diet and is often associated with damaged turf; however, its limited geographical distribution and low mobility reduce its impact. The southern mole cricket feeds chiefly on animal matter and apparently has little effect on established grass. The northern mole cricket is least damaging, perhaps because it occurs in lower numbers and usually in saturated soils near lakes and streams.

SURVEY AND DETECTION: Mole crickets generally reveal their presence by surface tunneling, but tunnels of small juveniles are inconspicuous and nearly formless. Once detected, mole crickets must be flushed from the soil if they are to be identified to species. Pyrethrins are the most effective flushing agents, but liquid dishwashing soaps (1 tablespoon per gallon of water = 15 ml per 4 liters) are cheap, available substitutes (5). The mixture is applied with a garden sprinkler can at a rate of ca. 1 quart per square foot (=1 liter per 0.1 m^2) and the treated area watched for emerging mole crickets for several minutes.

Flying mole crickets can be sampled at lights, but the most productive technique is to broadcast loud, simulated calling songs above a trapping device (7). Hundreds or even thousands can sometimes be collected during the flight period (starting 20 min. after sunset and ending about an hour later).

CONTROL: Since our pest mole crickets are introduced and are neither abundant nor damaging in their homelands, the prospects for biological control through importation of natural enemies are good. One natural enemy, Larra bicolor (Fabricius), a sphecoid wasp, was introduced in 1981 and is established at Fort Lauderdale. It is too early to judge its effect on mole cricket populations, but because its homeland is tropical Brazil, it probably cannot overwinter in most of the regions infested by Scapteriscus. Efforts are presently under way to identify natural enemies of Scapteriscus in Uruguay and Argentina for possible importation.

Chemical controls are expensive, temporary, and not always effective. Getting the toxicant to the mole crickets is difficult, sometimes making baits, including applicator-formulated ones (3), more cost-effective than drenches. Timing of insecticide application is crucial. The best time is generally when adults have ceased flying and their young are still small (in many areas, early summer). Consult your county agent for current chemical-control recommendations.

Some grasses, e.g. bahiagrasses, are more susceptible to mole cricket damage than others. Tests for resistant varieties are in progress.

NOMENCLATURE: The northern mole cricket was earlier known as Gryllotalpa hexadactyla Perty and as Gryllotalpa borealis Burmeister. Scapteriscus vicinus was once thought to be the same species as caused major damage to agriculture in Puerto Rico and was known by the common names Puerto Rican mole cricket and changa.

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The 3 species of Scapteriscus are most reliably separated by features of the forelegs (fig. 7, 12). The tawny mole cricket, Scapteriscus vicinus Scudder, has broad tibial dactyls that nearly touch at their bases (fig. 9) and a long trochantal blade (fig. 13). The southern mole cricket, Scapteriscus acletus Rehn and Hebard, and the short-winged mole cricket, Scapteriscus abbreviatus Scudder, have their tibial dactyls well separated, with those of the short-winged being slightly divergent (fig. 10, 11). The trochantal blade of the short-winged mole cricket is about half the length of the blade of the tawny mole cricket (fig. 15). The blade of the southern mole cricket is intermediate (fig. 14). The foreleg features that identify adults can also be used to identify juvenile mole crickets.

Other features are useful in identifying only, or principally, adults. Short-winged mole cricket adults differ from other species of Scapteriscus in having wings that are shorter than the pronotum. Southern mole crickets, in some areas, including peninsular Florida, can be identified by their 4-dot pronotal pattern (fig. 3). In other areas the patterns of southern and tawny mole crickets are confusingly similar (fig. 4, 5). Short-winged mole crickets have a highly variegated pronotal pattern (fig. 6).

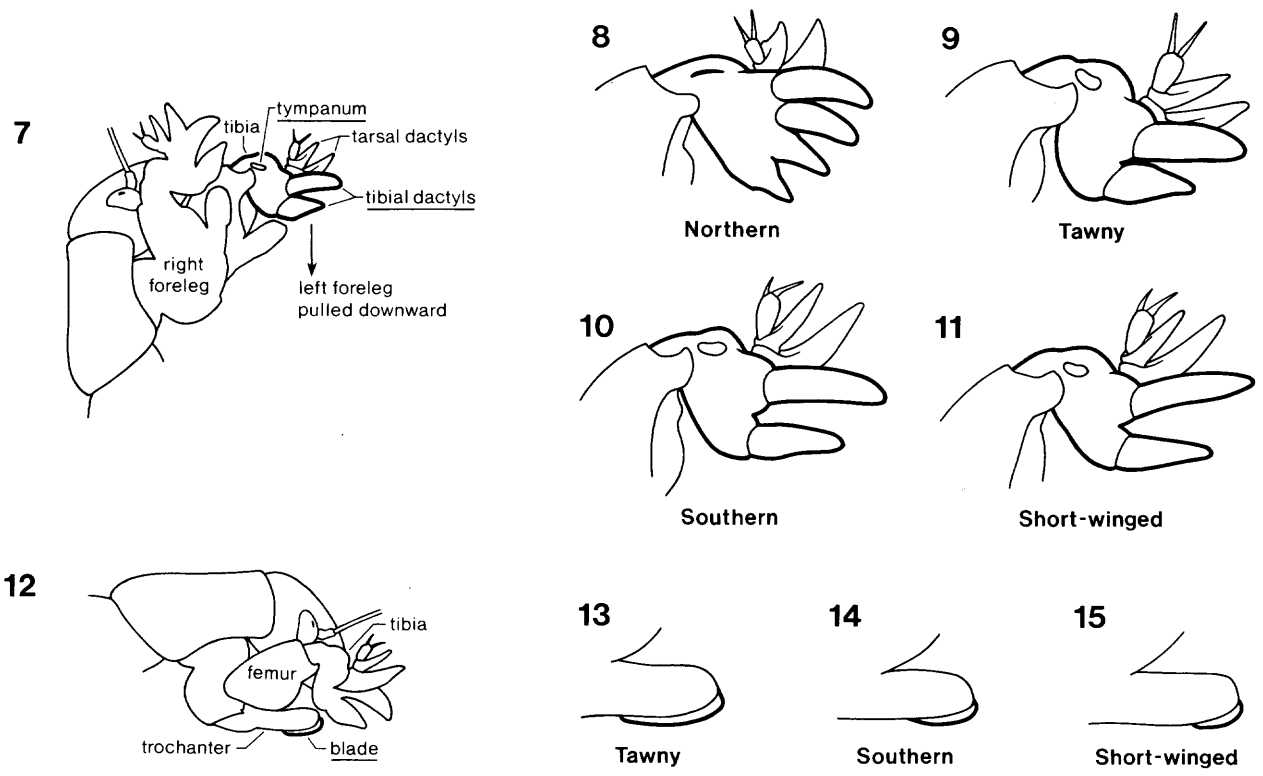

Fig. 7-15. Identifying features of mole cricket forelegs. Fig. 7. Names of parts. Fig. 8-11. Front view of foretibia. Fig. 8. Neocurtilla hexadactyla (note that auditory tympanum is concealed rather than open). Fig. 9. Scapteriscus vicinus. Fig. 10. S. acletus. Fig. 11. S. abbreviatus. Fig. 12. Location of trochantal blade. Fig. 13-15. Rear view of trochantal blade. Fig. 13. S. vicinus. Fig. 14. S. acletus. Fig. 15. S. abbreviatus.

DISTRIBUTION: The northern mole cricket occurs throughout all but northernmost eastern United States and the Florida Keys (fig. 20).

The 3 species of Scapteriscus were first introduced into the United States ca. 1900 (8). Their source was almost certainly temperate South America, where Buenos Aires and Montevideo were the principal ports. The manner of introduction is unknown, but dumping of ballast may have been responsible in some instances.

The tawny mole cricket (fig. 18) was first recorded in 1899, at Brunswick, Georgia. It slowly spread, completing its occupation of Florida by ca. 1960. Since that time it has continued westward to Mobile, Alabama. Its ultimate U.S. range is uncertain.